M/037/001

RIO ALGOM MINING CORP.
LISBON OPERATION
P.O. Box 1269
Moab, UT 84532-1269
(435) 686-2215
FAX (435) 686-2337

fax

to: Tony Gallegos

fax #: 1-801-359-3940

from: Frank Fossey

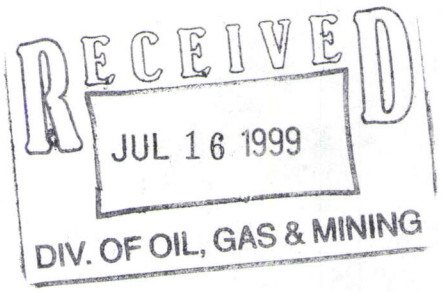
date: July 16, 1999

subject: Requested information

pages: 5/with Cover

NOTES: Thank You

M/037/001



July 16, 1999

Mr. Tony Gallegos, Reclamation Engineer
State of Utah, Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple
Suite 1210
Salt lake City, Utah 84114-5801

Via FAX

Re: Requested information on the graded bentonite product.

Dear Mr. Gallegos

Enclosed please find the requested information on the product we are proposing to use for the hole closures.

Please feel free to contact Mr. Ron Wells, Baroid IDP at 455 E Center Bountiful, UT 84010. Phone (801) 556-3073 of (801) 294-5080 if you need further information of the effectiveness of this product for our application.

Sincerely,

Frank Fossey
Radiation Safety Officer
RAMC- Lisbon Operation

Baroid Industrial Drilling Products

HOLEPLUG®
Graded Bentonite

Baroid's HOLEPLUG® size-graded bentonite is a naturally-occurring clay which is used to seal and plug earthen boreholes. HOLEPLUG is mined from specially-selected ore bodies which exhibit a high swell capability, but at a slower rate than drilling mud grade bentonite. HOLEPLUG will fall through a column of water standing in the hole and reach the bottom of the hole with minimum hydration or water swelling. Complete fill of the annular space can be achieved, and bridging of the particles in the upper hole is minimized. Complete fill of the annular space is necessary to form an effective, long-term plug in compliance with environmental regulatory requirements.

HOLEPLUG is available in two particle size grades:

- HOLEPLUG 3/4" (100% of particles pass through 3/4" screen; all particles retained on 3/8" screen)
- HOLEPLUG 3/8" (100% of particles pass through 3/8" screen; all particles retained on 1/4" screen).

The size of the open annular space will determine which size should be used. When the annular space is 3/4" or more, HOLEPLUG 3/8" should be used. When the annular space is 1-1/2" or more, HOLEPLUG 3/4" should be used.

Major Advantages:

- **Prevents entry of surface water** into boreholes
- **Prevents vertical movement of fluids** in the hole between porous zones
- **Forms a permanent, flexible downhole seal**
- **Facilitates pipe recovery**
- **Allows hole reentry**
- **Superior alternative to pelletized bentonite due** to easier application
- **Simple to apply** and no mixing expense
- **Weatherproof, easy-to-open packaging**
- **More cost-effective** compared to pelletized bentonite

Recommended Uses:

- **Highly recommended for environmental monitoring well applications**
- **Sealing outside casing annulus**
- **Sealing above gravel packs**
- **Plugging decommissioned bore holes**
- **Sealing around conductor pipe**
- **Sealing lost circulation zones**
- **Shutting off artesian wells**

NOTE
This product has been certified by the National Sanitation Foundation (NSF) to contribute no adverse health problems to ground water when used as the manufacturer recommends for the construction of potable water wells.

RON WELLS — PHONE (801) 556-3073
BAROID IDP
455 E. CENTER
BOUNTIFUL, UT 84010

Recommended Application Procedures:

Plugging and Stemming Drill Holes

Due to bag shipping, handling and possible slight dehydration, a small amount of fine bentonite particles may be present. For optimum results, HOLEPLUG should be poured over a mesh or screen with 1/4" openings to "sift out" the smaller particles. The screen should be large enough (approx. 1 sq. yd.) to be folded into a "V" shape to allow sifting while the product is being poured into the hole. Also, HOLEPLUG should be poured *slowly* (allow approximately two minutes to pour a 50 lb bag).

1. Open top of HOLEPLUG bag.
2. Hold the screen with one end slightly higher. The lower end should be placed over the bore hole.
3. Slowly pour HOLEPLUG diagonally down the "V" so that any fine particulate falls through the screen before the larger particles fall into the bore hole.
4. Fill hole as required (above static water level or to ground level).
5. Observe all regulatory specifications.

Stopping Loss of Circulation and Stabilizing Unconsolidated Formations

1. Pull drill pipe out of hole.
2. Pour HOLEPLUG graded bentonite into hole to fill above problem zone.
3. Drill ahead slowly with reduced pump pressure.

Plugging Artesian Water Flows

1. Pour HOLEPLUG graded bentonite into hole until water flow subsides or hole is filled to surface.
2. In case of severe flows, add BAROID® barite weighting material along with HOLEPLUG.

Amounts of HOLEPLUG Required for Plugging Applications

Hole Diameter (inches)	Hole Volume (cu. ft/ft)	Pounds HOLEPLUG Needed To Fill One Foot	Feet Filled By One Bag HOLEPLUG	Bags HOLEPLUG Needed To Fill 100 ft
2	0.022	1.6	31.3	3.2
2-1/2	0.034	2.5	20.0	5.0
3	0.049	3.5	14.3	7.0
3-1/2	0.067	4.8	10.4	9.6
4	0.087	6.3	7.9	12.6
4-1/2	0.110	7.9	6.3	15.8
5	0.136	9.8	5.1	19.6
5-1/2	0.165	11.9	4.2	23.8
6	0.196	14.1	3.5	28.2
6-1/2	0.230	16.6	3.0	33.2
7	0.267	19.2	2.6	38.4
7-1/2	0.307	22.1	2.3	44.2
8	0.349	25.1	2.0	50.2
8-1/2	0.394	28.4	1.8	56.8
9	0.442	31.8	1.6	63.6
9-1/2	0.492	35.4	1.4	70.8
10	0.545	39.2	1.3	78.4
11	0.660	47.5	1.1	95.0
12	0.785	56.5	0.89	113.0
15	1.227	88.3	0.57	176.6
18	1.767	127.2	0.39	254.4
20	2.182	157.1	0.32	314.2
25	3.409	245.4	0.20	490.8
30	4.909	353.4	0.14	706.8

Physical Characteristics:

Bulk Density, uncompacted	
HOLEPLUG 3/4"	71.8 lb/ft³
HOLEPLUG 3/8"	68.8 lb/ft³
Moisture	17%
Permeability of resulting plug	
	K = 1.5 x 10^{-9} cm/sec.
Appearance	beige to tan powder
Specific Gravity	2.5 to 2.6

Mineralogical Analysis (x-ray diffraction) – (typical Wyoming bentonite)

85%	Montmorillonite
5%	Quartz
5%	Feldspars
2%	Cristobalite
2%	Illite
1%	Calcium and Gypsum

Chemical Analysis (typical)

SiO_2	55.44%
Al_2O_3	20.14%
Fe_2O_3	3.67%
CaO	0.49%
MgO	2.49%
Na_2O	2.76%
K_2O	0.60%
Bound water	5.50%
Moisture (@ 220°F)	8.00%
TOTAL	99.09%

Environmental Information:

HOLEPLUG graded bentonite is a natural, unaltered mineral with no added chemicals or contaminants. HOLEPLUG does not spoil or ferment.

HOLEPLUG graded bentonite is environmentally safe and complies with the EPA's protocol for TCLP (toxicity characterization leaching procedure). Lab report available on request.

HOLEPLUG graded bentonite is non-toxic (96-hour LC_{50} on *Mysidopsis bahia* is greater than 100,000 ppm).

Packaging:

HOLEPLUG graded bentonite is packaged in multiwall paper bags containing 50 pounds (22.7 kg).

Availability:

HOLEPLUG may be purchased through Baroid Service Centers or from QUIK-GEL® Distributors.

Baroid Drilling Fluids, Inc.
P.O. Box 1675
Houston, Texas 77251
Customer Service: (713) 987-4547

Baroid Drilling Fluids, Inc.
410 17th St., Suite 1870
Denver, Colorado 80202
(303) 825-5712

Rev. 9/92 IDP-006
Printed in U.S.A.